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INTEGRATED INFORMATION SUPPORT SYSTEM (IISS)
Volume IV - IISS System
Part 3 - System Test Plan

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This system test plan defines the methodology and acceptance criteria for performing system testing on the IISS software and documentation for the current release. It also defines the criteria that the software and documentation must meet for release.

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FOREWORD

This technical report covers work performed under Air Force Contract F33600-87-C-0464, DAPro Project. This contract is sponsored by the Manufacturing Technology Directorate, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio. It was administered under the technical direction of Mr. Bruce A. Rasmussen, Branch Chief, Integration Technology Division, Manufacturing Technology Directorate, through Mr. David L. Judson, Project Manager. The Prime Contractor was Integration Technology Services, Software Programs Division, of the Control Data Corporation, Dayton, Ohio, under the direction of Mr. W. A. Osborne. The DAPro Project Manager for Control Data Corporation was Mr. Jimmy P. Maxwell.

The DAPro project was created to continue the development, test, and demonstration of the Integrated Information Support System (IISS). The IISS technology work comprises enhancements to IISS software and the establishment and operation of IISS test bed hardware and communications for developers and users.

The following list names the Control Data Corporation subcontractors and their contributing activities:

SUBCONTRACTOR	ROLE
Control Data Corporation	Responsible for the overall Common Data Model design development and implementation, IISS integration and test, and technology transfer of IISS.
D. Appleton Company	Responsible for providing software information services for the Common Data Model and IDEF1X integration methodology.
ONTEK	Responsible for defining and testing a representative integrated system base in Artificial Intelligence techniques to establish fitness for use.
Simpact Corporation	Responsible for Communication development.
Structural Dynamics Research Corporation	Responsible for User Interfaces, Virtual Terminal Interface, and Network Transaction Manager design, development, implementation, and support.
Arizona State University	Responsible for test bed operations and support.

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SECTION 1

INTRODUCTION

1.1 Objective

This plan defines the requirements, procedures, environments, and time control schedules that will be used to integrate and build, test, validate, release and support the Integrated Information Support System (IISS) for release 3.0 scheduled for September 30, 1990.

1.2 Scope

The following tasks are required to meet these objectives:

1) Test preparation;
2) Configuration management;
3) Integration and build;
4) System installation and testing;
5) Release; AND
6) Support.

These tasks will be performed by the Control Data Corporation's Manufacturing Technology Integration and Test (I&T) team located in Dayton, Ohio. The team's responsibility is to quarantee the functionality and quality of the IISS release 3.0.

1.3 IISS Release 3.0 Contents

The IISS release 3.0 will include the following new items or enhancements:

Common Data Model Subsystem

- CDM Reports
  - Eight reports have been developed to report the contents of the CDM
- Impact Analysis
  - Complete support for IDEF1X
  - Problem corrections
- NDDL
  - Complete support for IDEF1X
  - Drop LOGICAL UNIT OF WORK (LUW) command
  - Problem corrections
- NDML
  - Complete support for IDEF1X
  - NDML embedded in C programs
  - Request Processor programs in C and Fortran
  - Embedded SQL in COBOL, C, and Fortran programs
  - generated Domain Verification logic moved on line instead of seperate module
  - Problem corrections

Communication Subsystem

- IBM - VAX COMM upgrades

Electronic Documentation System

- Phase 1
  - SGML Tagger for ICAM documents
  - generic DTD Builder for ICAM documents
  - SGML Parser
  - Layout Editor
  - Document Formatter
  - UI Postscript device driver
  - MacPaint/Postscript translator

User Interface Subsystem

- Rapid Application Generator and Report Writer
  - Empty condition
  - Multiple conditions per function key
  - Conditions with Boolean logic
  - Comparison operators in RW conditions
- Reverse VTI
- Business Graphs - Phase 1
- New color/graphics terminal support
- Dynamic fields
- Grandchild Support (UI-AP) in NTM
- File I/O primitives
- DB2 Support

Plus

- Enhancements and changes for Release 2.2.5
  - SYSGEN utility (User Interface)
  - ORACLE to sequential file conversion (User Interface)
  - Parameter forms
  - Call action
- Release 2.3 documentation (see subsection 2.3 for release document list)

SECTION 2

REFERENCE DOCUMENTS AND STANDARDS SUPPORTED

The documents and standards listed in this section will be used as baseline reference material by the I&T team to assure that the design, funtionality, and quality are contained in the system delivered.

2.1 Release 3.0 Documents

2.1.1 Configuration Management Documents

Document Type	Title
FTR620300001	Project Overview: Executive Summary
FTR620300002	Project Overview: Technical Summary
QAP620320000	Quality Assurance Plan
SUM620320000	System Administrator's Guide
TCD620321000	Technical Control Document
SCD620322000	Schedule Control Document
SUM620323000	System User Manual
CMU620324000	SCM User's Manual
CMA620324000	SCM Administrator's Manual
DS 620324000	SCM Development Specification
UM 620324000	Software Development Guidelines
SUM620324000	System Software Document
OM 620324001	VAX Installation Guide for Executable Code
OM 620324002	IBM Installation Guide
UM 620325000	DM User's Manual
SUM620325000	FAD Administrator's Manual
SRB620326000	Software Release Bulletin
SAB620326000	Software Availability Bulletin
OM 620324001	VAX Installation Guide for Source Code

2.1.2 IISS System

SRD620340000	System Requirements Document
SDS620340000	System Design Specification
STP620340000	System Test Plan
STP620340001	System Integration Test
STR620340000	System Test Report
EIF620350001	EIF Technical Report
EIF620350002	EIF Technical Report

2.1.3 Common Data Model Subsystem

Document Type	Title
UM 620341001	CDM Administrator's Manual
UTP620341000	CDMP Test Case Report
TBM620341000	CDMP: IDEF1 Model of the CDM - CDM Design Specification
UM 620341002	Information Modeling Manual - IDEF1X
DS 620341100	NDDL Processor Development Specification
PS 620341100	NDDL Processor Product Specification
UM 620341100	NDDL User's Guide
PRM620341200	NDML Programmer's Reference Manual
DS 620341200	NDML Precompiler Development Specification - CDMP Design Specification
PS 620341200	NDML Precompiler Control Module Product Specification
PS 620341211	NDML Precompiler Parse Application Program Product Specification
PS 620341212	NDML Precompiler Parse Process Division Product Specification
PS 620341213	NDML Precompiler Parse NDML Product Specification
PS 620341231	NDML Precompiler Transform NDML Product Specification
PS 620341232	NDML Precompiler Decomposition Concept Product Specification
PS 620341251	NDML Precompiler Select Internal Schema Product Specification
PS 620341252	NDML Precompiler Transform Internal Schema Product Specification
PS 620341253	NDML Precompiler Generate Conceptual Schema Product Specification
PS 620341254	NDML Precompiler Generate Oracle Request Product Specification
PS 620341255	NDML Precompiler Generate CODASYL Product Specification
PS 620341256	NDML Precompiler Generate Total Request Product Specification
PS 620341258	NDML Precompiler Build Calls/Messages Product Specification
PS 620341259	NDML Precompiler Build Source Code Product Specification
PS 620341260	NDML Precompiler Generate Support Product Specification
PS 620341261	NDML Precompiler Generate Request Product Specification
DS 620341310	Distributed Request Supervisor Development Specification
PS 620341310	Distributed Request Supervisor Product Specification
DS 620341320	Data Aggregators Development Specification
PS 620341320	Data Aggregators Product Specification

DS 620341330	File Utilities Development Specification
PS 620341330	File Utilities Product Specification
UM 620341400	CDM Subsystem Database Build Instructions User Manual
UM 620341401	Define/Construct the NDDL for the Common Data Model Subsystem User Manual
UM 620341403	CDM Reports and Application User's Guide
DS 620341410	DDL to NDDL Translator Development Specification
UTP620341410	DDL to NDDL Translator Test Plan
UM 620341410	DDL to NDDL Translator User Manual
UM 620341411	DDL to NDDL Translator Build Instructions User Manual
DS 620341420	CDM Impact Analysis Development Specification
UTP620341420	CDM Impact Analysis Unit Test Plan
UM 620341420	CDM Impact Analysis User Manual
UM 620341421	Impact Analysis Build Instructions User Manual
DS 620341430	CDM Compare Utility Development Specification
UTP620341430	CDM Compare Utility Unit Test Plan
UM 620341430	CDM Compare Utility User's Manual
UM 620341431	CDM Compare Build Instructions User's Manual
UM 620341440	SQL User's Manual
PRM620341440	SQL Reference Manual
IRD620341500	CDM IRDS Feature Evaluation Report

2.1.4 Network Transaction Manager Subsystem

Document Type	Title
DS 620342000	Network Transaction Manager Development Specification
PRM620342000	NTM Programmer's Guide
OM 620342000	NTM Operator's Manual
SUM620342000	NTM System Programmer's Manual
PS 620342100	NTM Monitor Product Specification
PS 620342200	NTM MPU Product Specification
PS 620342300	NTM Services Product Specification

2.1.5 Communications Subsystem

Document Type	Title
DS 620343000	COMM Development Specification
PS 620343100	Generic COMM Protocol Product Specification
PS 620343200	VAX IPC Product Specification
DS 620343300	IBM IHC and IPC Development Specification
PS 620343400	File I/O Primitives Product Specification
UTP620343400	File I/O Primitives Unit Test Plan

2.1.6 User Interface Subsystem

Document Type	Title
OM 620344000	Terminal Operator's Guide
DS 620344100	User Interface Services Development Specification - User Interface Management System Development Specification
PS 620344100	User Interface Services Product Specification
UTP620344100	User Interface Services Unit Test Plan
DS 620344200	Form Processor Development Specification
UM 620344200	Form Processor User Manual
UTP620344200	Form Processor Unit Test Plan
PS 620344200	Form Processor Product Specification
UTP620344403	Graph Definition Language
UTP620344220	Graph Support System
DS 620344300	Virtual Terminal Development Specification
PS 620344300	Virtual Terminal Product Specification
UM 620344300	Virtual Terminal User Manual
UTP620344300	Virtual Terminal Unit Test Plan
UM 620344400	Forms Editor User Manual
DS 620344401	Forms Language Compiler Development Specification
PS 620344401	Forms Language Compiler Product Specification
UTP620344401	Forms Language Compiler Unit Test Plan
DS 620344402	Forms Driven Editor Development Specification
PS 620344402	Forms Driven Editor Product Specification
UTP620344402	Forms Driven Editor Unit Test Plan
DS 620344403	Graph Language Development Specification
DS 620344501	Rapid Application Generator and Report Writer Development Specification
PS 620344501	Report Writer Product Specification
UM 620344501	Application Generator User Manual
UTP620344501	Report Writer Unit Test Plan
PS 620344502	Rapid Application Generator Product Specification
UTP620344502	Rapid Application Generator Unit Test Plan
DS 620344600	Text Editor Development Specification
PS 620344600	Text Editor Product Specification
UM 620344600	Text Editor User Manual
UTP620344600	Text Editor Unit Test Plan
DS 620344700	Application Interface Development Specification
PS 620344700	Application Interface Product Specification
UTP620344700	Application Interface Unit Test Plan
UTP620344800	Layout Optimization System Unit Test Plan
DS 620344800	Layout Optimization System Development Specification
DS 620344900	Electronic Documentation System Development Specification

UM 620344900	Electronic Documentation System User Manual
UTP620344901	SGML Tagger Unit Test Plan
UTP620344902	EDS Parser Unit Test Plan
UTP620344903	EDS Document Type Definition Unit Test Plan
UTP620344904	EDS Layout Editor Unit Test Plan
UTP620344905	EDS Document Formatter Unit Test Plan
UTP620344906	EDS MacPaint to Postscript Unit Test Plan

2.2 Standards

The ICAM Documentation Standards manual, IDS150120000C, 15 September, 1983, and the Software Development Guidelines are the primary standards and guidelines by which the release documentation and software will be evaluated.

SECTION 3

REQUIREMENTS

This section defines the criteria required to begin the integration and system testing activity, the hardware and software system environment necessary for performing integration and testing, the system test completion criteria, and the release criteria.

3.1 Integration and Test Start Requirements

The following requirements or criteria must be satisfied prior to begining system integration and build:

1. Unit test plans and reports for all subsystems must be received by I&T.

2. All subsystem modules must be processed through Configuration Management.

3. The following logicals must be used by all subsystems in all command procedures, data files, option files, etc., required to build and run IISS:

UIDIR - used for UI development
CDMDIR - used for CDM development
NTMDIR - used for NTM development
COMMDIR - used for COMM development
IPCDIR - used for IPC development

NOTE: Any other required logical for building and running IISS must be specified with a function statement and where it points; for example, IISSMLIB and IISSGLIB.

4. All command procedures used to build and run IISS. These commands refer to the logicals listed at item 3 and represent "device:[top-level-directory]." These procedures are to include any files that currently use test-bed-dependent logicals. In addition, command procedures that run executables should refer to each executable as LOGICAL:[RUNAREA].

5. Subdirectories that contain all files to be tested as well as an object library (when required) that holds routines used during testing only. These are to be established and specified by each development group.

6. Link procedures will allow the placement of executables in a common run area; format: your-logical:[RUNAREA].

7. All ORACLE files required to build a CDM without CDM meta data and a CDM with CDM meta data.

Note: Hardcopy listings of all files and procedures required in items 1 - 6 must be submitted when these are requirements are delivered.

8. All user documentation required for release must be received in draft format by I&T.

9. System Test Plan must be completed and approved.

10. All test preparation activities completed by I&T:

- o I&T support personnel identified (in company, coalition members, etc.)
- o Development focal points established
- o Test bed accounts and directories identified and allocated
- o Proper test bed privileges verified
- o Available machine resources verified:
  - Disk space on VAX and IBM test bed configuration
  - Communications network to the test bed CPUs
  - CPU capacity on the test bed
  - Terminals required for testing
  - Printers
- o ORACLE environment established for testing
- o A backup of the VAX Configuration Management and I&T accounts.

3.2 System Test Completion Criteria

System testing will be considered complete when the following conditions or criteria have been satisfied:

1. All test cases defined in the unit test plans have been completed successfully.

2. Installation testing has been completed successfully.

3. All system level tests have been completed successfully or have been determined to perform acceptably.

4. All errors reported have been resolved.

3.3 Release Requirements

The successfully tested IISS release 3.0 will be released when the following conditions or criteria have been satisfied:

1. Installation manual validated and in final draft format.

2. Release manuals listed in subsection 2.3 approved and in final draft format.

3. System test report approved.

4. Release and support plan and schedule approved.

5. Executables in install-and-execute format backed up on magnetic tape.

SECTION 4

INTEGRATION AND TEST METHODOLOGY

This section defines the methods that will be used to integrate, build, and test the IISS release 2.3. All test error reporting will be done using a modified version of the Central ICAM Development System Problem Report (CPR) mechanism, briefly described in 4.1, Configuration Management.

The Release 2.3 time requirements may cause the performance of the activities defined in this section to be adjusted to fit the time constraints.

4.1 Configuration Management

The configuration management activities will be coordinated by the I&T's configuration management administrator. The source is received from the development groups and processed through configuration management. Once all source code has been checked in and all the conditions listed under subsection 3.1 have been satisfied, compilation activity will be initiated. Object files and executables will be built. After all problems that may have occurred, i.e., link problems, etc., have been fixed or resolved, a magnetic tape containing an IISS release 2.3 executable that includes all the command files and data files necessary for installation and execution will be prepared for system testing.

4.2 System Testing

The I&T test personnel will perform three test processes: installation testing, regression testing, and document verification. During the performance of these test processes several control procedures will be used to monitor and provide information to the test analysts. A major procedure used will be the test status log. This log will show the status of all tests run to date. It will contain annotations describing any

unexpected or exceptional events which may have occurred during the execution of any test case or test type. It also will contain descriptions of any or all deviations required to complete a test case or type. The test status log will contain a column under which a correction that has been applied that indicates whether or not the test case or test type has been reexecuted to verify the correctness of the solution.

Use of the test status log will provide a tracking mechanism for the testing team to use in determining what tests to run next, and also will provide evidence of test case or test type performance.

4.2.1 Installation Testing

Installation testing is used to verify that the delivery mechanism is correct, reliable, and simple to use. Installation will be done using instructions contained in the Installation Manual. This manual has been prepared by the Integration and Test team. Installation testing must be completed successfully before starting any other test process. Errors in the Installation Manual will be noted but will not cause a delay in beginning the other test processes.

4.2.2 Regression Testing

Regression testing involves using the cases provided by the unit test plans and the system test plan. These tests exercise collectively each of the integrated subsystems. These test cases also will include negative testing, that is, tests that verify error responses to invalid input. These tests are called regression tests because they are used to assure compatibility with previous releases as well as assuring that any changes or enhancements that have been made for the release do not negatively impact or affect a subsystem's or the system's functionality or quality.

4.2.3 Documentation Verification and Release Preparation

The user manuals will be evaluated for reliability, readability, and ease of use. The installation manuals will be evaluated and updated during the installation and test process. All documents will be released in final draft (camera ready) format.

4.3 Quality Assurance

Throughout the integration and test process the test team will guarantee the functionality and quality of the IISS release by assuring the following quality characteristics are built into it:

Compatibility	Installability	Maintainability
Flexibility	Reliability	Portability
Testability	Reuseability	Efficiency
Correctness		

These characteristics are defined in the Quality Assurance Plan (see subsection 2.1).

4.4 Problem Reporting

All detected errors or problems will be reported using the Central ICAM Development System Problem Report (CPR) mechanism or a similar system. The CPR or similar system will provide users a means of reporting and resolving problems concerning the software, hardware, communications, and documents pertaining to IISS release 2.3. Refer to section 2.0 for the name and publication number of the CPR user manual.

SECTION 5

INTEGRATION AND TEST SCHEDULE

The following schedule will be used by the I&T team:

Activity	Start	End
Cleanup I&T directories	10/19	11/15
System Test Plan approved	12/9	
Source code check-in	12/9	1/6
Move source code	1/6	1/13
Link and build executables	1/13	2/5
System testing	2/5	3/7
Build system installation tape	3/7	3/11
Installation testing	3/11	3/16
Draft system test report	3/7	3/25
Finalize release documentation	12/15	5/15
End release phase	3/31	
Begin support phase	3/31	

APPENDIX A

HELPFUL RULES

This appendix has been added to list and describe several of the common rules that should be followed in successfully getting software integrated and tested for release. Explanations of some of the terms used herein also have been added.

Rule 1

The development groups must provide I&T a list of all release code not checked in by the code cut-off date (see Rule 5). This document must include why specific code was not checked-in (i.e., obsoleted, not to be included in this release, or critical error - see Rule 3).

Rule 2

The development groups must turn in a list of all software that was checked in but not unit tested (along with a reason why testing was not done).

Rule 3

If code does not work as required or can not be fixed by the code cut-off date and its use does not prevent the subsystem from functioning (i.e., non-critical), it still must be checked in. (See Rule 4.) Note: critical problems are those type conditions that prevent the subsystem from functioning, totally. System testing can not begin until all critical problems are resolved.

Rule 4

The I&T point of contact person should be informed in writing of all non-working and worked-around code; I&T then can write a problem report against it; this will authorize the process to fix it.

Rule 5

After the code cut-off date, no release code other than fixed or resolved code originally reported as errors by I&T can be checked-in. (After code is checked in to I&T, it can not be checked out and in again unless a problem report has been written against it and a resolution has been attained. See Rule 6.)

Rule 6

Updated, changed or fixed code should not be turned in before it has been unit tested.

Rule 7

Returned code must include a completed problem report. If development can not fix a reported, non-critical problem, use the problem report form and a disclaimer form to (1) restate the problem definition, (2) explain why the problem can not be fixed for this release or by the required date, (3) give the approximate date when it can be fixed, and, if possible, (4) provide a problem work-around.

Explanation of Terms Used in This Appendix

fix: Repair of a software process or routine to allow its function to work as designed.

resolve: Fix or apply a work-around.

work-around: A solution applied to temporarily handle a problem that will allow all other related processes to function.

problem report: A pre-printed form used by I&T to report and manage release problems and resolutions.

disclaimer form: A pre-printed form used by development to state why a specific feature, enhancement, or code is not included or non-functional for the current release.

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